MLR Automotive Engine Repair and Performance

Career Cluster	Transportation, Distribution & Logistics
Course Code	20121
Prerequisite(s)	Introduction to Vehicle Systems and Maintenance or Maintenance and Light Repair - Recommended
Credit	1
Program of Study and Sequence	Foundational courses – Introduction to Vehicle Systems and Maintenance or Maintenance and Light Repair – **Automotive Engine Repair and Performance** – Capstone Experience
Student Organization	SkillsUSA
Coordinating Work-Based Learning	NA
Industry Certifications	NA
Dual Credit or Dual Enrollment	NA
Teacher Certification	Transportation, Distribution & Logistics Cluster Endorsement; Autobody Technology Pathway Endorsement; *Autobody Technology
Resources	

Course Description:
Completion of Automotive Engine Repair and Performance will help students prepare for post-secondary education and training. This course will further the students' technical education experience and help prepare them for the workforce.
Students will learn:
- How to work safely on the vehicle in a workshop situation.
- Engine operation based on the six operating systems: lubrication, cooling, fuel, ignition, air induction and exhaust systems.
- General engine maintenance to include valve train, lubrication and cooling system.
- General engine performance to include computerized controls, fuel, air induction, exhaust systems and emissions control systems.

Course Standards

EPER 1: Students will demonstrate automotive technology safety practices, as identified in Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) requirements for an automotive repair facility.

Webb Level	Sub-indicator	Integrated Content
Level 1: Recall and Reproduction	EPER 1.1 Demonstrate automotive technology safety practices. Examples: • Identify general shop safety rules and procedures. • Identify and use proper procedures for safe jack and lift operations. • Utilize proper ventilation procedures for working within the lab/shop area. • Identify the location and the types of fire extinguishers and other fire safety equipment. • Identify the location and use of eye wash stations. • Identify the location of posted evacuation routes. • Locate and demonstrate knowledge of Safety Data Sheets (SDS).	• NATEF tasks that apply to sub-indicators • OSHA 10 • "Right to Know" Federal Law • EPA

Notes

EPER 2: **Students will demonstrate proper tool selection and usage.**

Webb Level	Sub-indicator	Integrated Content
Level 1: Recall and Reproduction	EPER 2.1. Demonstrate proper tool selection and usage. Examples: • Identify tools and their usage in automotive applications. • Identify standard and metric designation. • Demonstrate safe handling and use of appropriate tools. • Demonstrate proper cleaning, storage, and maintenance of tools and equipment. • Demonstrate proper use of precision measuring tools (e.g. micrometer, dial-indicator, dial-caliper).	

Notes

EPER 3: Students will prepare the vehicle for service.

Webb Level	Sub-indicator	Integrated Content
Level 2: Skill/Concept	EPER 3.1 Perform preparatory procedures for vehicle service. Examples: • Identify information needed and the service requested on a repair order. P-1 • Identify purpose and demonstrate proper use of fender covers, mats. • Demonstrate use of the three C's: concern, cause, and correction. • Review vehicle service history. P-1 • Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. P-1	• NATEF tasks that apply to sub-indicators

Notes: P-1, P-2, P-3 refers to levels of difficulty under NATEF tasks (P-1 lowest)

EPER 4. Students will perform engine repair.

Webb Level	Sub-indicator	Integrated Content
Level 2 Skill/Concept	EPER 4.1 Perform engine maintenance operations. Examples: • Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins. P-1 • Verify operation of the instrument panel engine warning indicators. P-1 • Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action. P-1 • Install engine covers using gaskets, seals, and sealers as required. P-1 • Verify engine mechanical timing. P-2 • Perform common fastener and thread repair, to include: remove broken bolt, restore internal and external threads, and repair internal threads with thread insert. P-1 • Identify service precautions related to service of the internal combustion engine of a hybrid vehicle. P-1	• NATEF tasks that apply to sub-indicators
Level 2: Skill/Concept	EPER 4.2 Understand component operation and perform maintenance on cylinder head and valve train. Examples: • Adjust valves (mechanical or hydraulic lifters). P-2 • Identify components of the cylinder head and valve train. P-1	• NATEF tasks that apply to sub-indicators

Level 2: Skill/Concept	EPER 4.3 Test, inspect and perform maintenance on the lubrication and cooling system. Examples: • Perform cooling system pressure and dye tests to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, heater core, and galley plugs; determine necessary action. P-1 • Inspect, replace, and/or adjust drive belts, tensioners, and pulleys; check pulley and belt alignment. P-1 • Remove, inspect, and replace thermostat and gasket/seal. P-1 • Inspect and test coolant; drain and recover coolant; flush and refill cooling system; use proper fluid type per manufacturer specification; bleed air as required. P-1 • Perform engine oil and filter change; use proper fluid type per manufacturer specification; reset maintenance reminder as required. P-1 • Identify components of the lubrication and cooling systems. P-1	• NATEF tasks that apply to sub-indicators

Notes

EPER 5. Students will test, diagnose, and repair engine performance issues.

Webb level	Sub-indicator	Integrated Content
Level 3: Strategic Thinking	EPER 5.1. Perform engine diagnostics and analyze retrieved data. Examples: • Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins. P-1 • Perform engine absolute manifold pressure tests (vacuum/boost); document results. P-2 • Perform cylinder power balance test; document results. P-2 • Perform cylinder cranking and running compression tests; document results. P-2 • Perform cylinder leakage test; document results. P-2 • Verify engine operating temperature. P-1 • Remove and replace spark plugs; inspect secondary ignition components for wear and damage. P-1	• NATEF tasks that apply to sub-indicators
Level 3: Strategic Thinking	EPER 5.2. Test the computerized controls and analyze retrieved data. Examples: • Retrieve and record diagnostic trouble codes (DTC), On-board Diagnostic (OBD) monitor status, and freeze frame data; clear codes when applicable. P-1 • Describe the use of the OBD monitors for repair verification. P-1	• NATEF tasks that apply to sub-indicators
Level 2: Skill/Concept	EPER 5.3. Perform maintenance on the fuel, air Induction, and exhaust systems Examples: • Replace fuel filter(s) where applicable. P-2 • Inspect, service, or replace air filters, filter housings, and intake duct work. P-1 • Inspect integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields; determine necessary action. P-1 • Inspect condition of exhaust system hangers, brackets, clamps, and heat shields; determine necessary action. P-1 • Check and refill diesel exhaust fluid (DEF). P-2	• NATEF tasks that apply to sub-indicators

Level 2: Skill/Concept	EPER 5.4. Perform maintenance operations on emissions control system. Examples: • Inspect, test, and service Positive Crankcase Ventilation (PCV) filter/breather, valve, tubes, orifices, and hoses; perform necessary action. P-2	• NATEF tasks that apply to sub-indicators

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